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Leucoagaricus lilaceus (*Agaricaceae*), a poorly known Neotropical agaric

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Abstract — The type collection of *Leucoagaricus lilaceus* was studied. This poorly known Neotropical member of *Agaricaceae* is fully described and illustrated for the first time. This species is known only from Brazil and Argentina.

Key words — *Agaricales, Basidiomycota*, biodiversity, taxonomy, Itapuã Park

Introduction

South American agaric species have long been collected and described during mycological investigations by many researchers, including Dennis (1961, 1970), Rick (1937, 1938a, 1938b, 1939, 1961), Singer (1953, 1973, 1989), Singer & Digilio (1952), and Spegazzini (1926). Many of these early species that are known only from their first report were originally documented only by a Latin diagnosis unaccompanied by illustrations. Additional collection aided by re-evaluation of type materials is needed to establish knowledge of the native mycobiota. Much hard taxonomic work is now being conducted in investigating members of the large family *Agaricaceae*, including the species discussed below.

Leucoagaricus lilaceus was described by Singer (Singer & Digilio 1952), who limited his protologue to an elaborate Latin diagnosis that lacked accompanying pictures or plates. During a survey of the mycobiota of Itapuã State Park and sporadic visits to Farroupilha Park in southern Brazil, some collections of this interesting mushroom were gathered and fully illustrated both macro- and microscopically. The present paper offers a detailed description of this poorly known species accompanied by full drawings and photos. It comprises preliminary results of a survey of the *Agaricaceae* found in Itapuã State Park, Rio Grande do Sul State, Brazil.

Materials and methods

All collections were obtained in the state of Rio Grande do Sul, Brazil, from Itapuã State Park (30°20'–30°27' S and 50°50'–51°05' W within the municipality of Viamão; see also Silva et al. 2006) or Farroupilha Park (30°02' S and 51°13' W within the municipality of Porto Alegre). Macroscopic analysis of the basidiomata followed Largent (1977). Color terminology was taken from Kornerup & Wanscher (1978). Microscopic observations were made after drying, with thin sections mounted in 5% KOH and 1% Congo Red solutions (Largent et al. 1986). In the basidiospore descriptions, the abbreviation *Q* denotes the length/width quotient, with Q_{av} denoting the average *Q*. The notation [210,7,7] indicates that measurements were made on 210 spores in seven samples from seven collections. Microscopical observations were made using a LEICA DM LS2 optical microscope; line drawings of all microstructures were rendered using a drawing tube. Specimens were deposited in the herbarium ICN, and material deposited in BAFC and LIL was studied as well.

Results and discussion

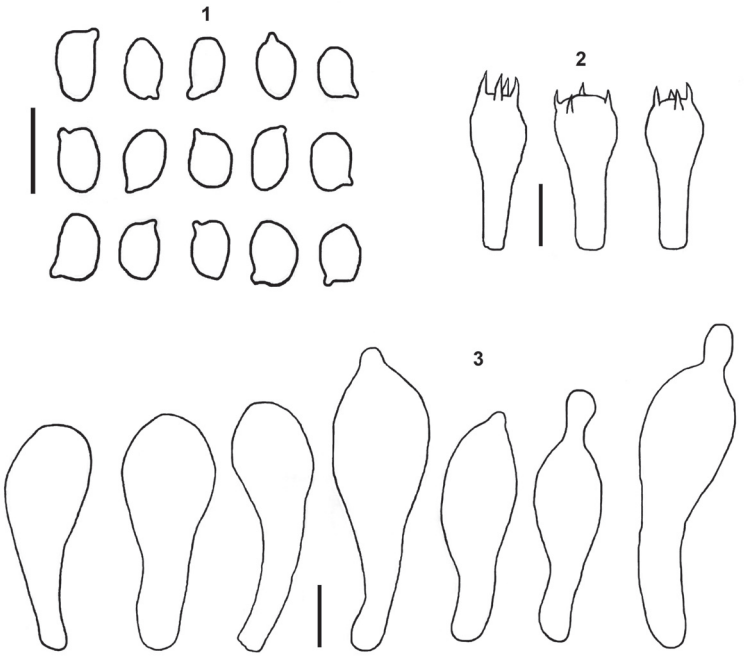
Leucoagaricus lilaceus Singer, Lilloa 25: 274 (1952) '1951'. Figs. 1–10.

Description of type collection (Singer T 396 [LIL])

Singer & Digilio (1952): "*Pileo lilaceo-purpureo, interdum fibrillis pallidis appressis in centro, sed centro plerumque subvelutino ex strato palisadico cuticulae et haud rimoso, marginem versus minute rimuloso et interdum demum rimoso squamoso vel rimoso-granuloso, inter squamulas granulosque albo vel brunneo vel vinaceo, sicco, convexo, dein applanato demum interdum concavo, subumbonato, vel obtuse umbonato, 46-89 mm lato; marginem projiciente sterili in parte inferiore vinaceo. Lamellis albis, demum brunneis ubi laesae erant, confertis, 6 mm latis, liberis, collariatis; sporis in cumulo pallide auranticremeis. Stipite albo vel albido, saepe pallide vinaceo-tincto, demum dilute fusco vel fusco, fibrilloso ad apicem, glabro subtus, levi, attenuato, apicem versus vel aequali, initio ventricoso, saepe bulbo conspicuo albo praedito (18-20 mm lato), cavo, 50-60 x 9-12 mm (ad apicem); annulo duplico haud mobili sed demum saepe lacerato, margine superiore angustiore marineque inferiore vinaceo vel toto latere inferiore ceterum albo vel albido cum margine pilei continuo in juvenilibus, apicali, conspicuo. Carne alba autoxydatione brevi ferruginescente-fulvescente dein fuscescente, dein obscuriore, odore nullo vel aniseo. Sporis 5.8-6.5 x 4.3-4.8 µm, pseudoamyloideis, meachromaticis azureo cresylico, poro germinativo manifesto destitutis, membrana moderate crassa instructis, levibus; basidiis tetrasporis; (pleuro-) cystidiis nullis; epicute pilei trichodermio palisadico efformata, elementis trichodermii erectis, inter se parallelis, cylindraceis vel clavatis, interdum apice ampullaceis vel hyphoso-extractis, intus guttulis hyalinis, castaneis, fulvomelleis repletis, 25-63 x 8.8-13.2 µm; hyphis omnibus haud amyloideis, defibulatis. Ad terram in hortis.*"

Type study of Singer T 396 (LIL) Figs.1–3, 9

Basidiospores [40,1,1], 6–7.5(–8) × 4.5–5.5 µm, Q = 1.33–1.60, Q_{av} = 1.45, ellipsoid, hyaline, slightly thick-walled, without germ pore, dextrinoid,



Figures 1–3. *Leucoagaricus lilaceus*. (Singer T 396 [LIL]).
1: Basidiospores. 2: Basidia. 3: Cheilocystidia.
Scale bar = 10 µm.

congophilous, metachromatic in Cresyl Blue. Basidia 20–23 × 7–8 µm, clavate, hyaline, thin-walled, smooth, bearing four sterigmata 2–3.5 µm long. Pleurocystidia absent. Cheilocystidia 30–50 × 10–15 µm, usually narrowly clavate, clavate, mucronate and capitate but sometimes lageniform, hyaline, thin-walled, smooth. Pileipellis a cutis made up of prostrate hyphae with hyaline to grey pigment. Erect elements were not seen in the herbarium material. Clamp-connections absent.

Description of modern material Fig. 4–8, 10

Pileus 35–75 mm, convex, plano-convex to applanate, with a low umbo; light brown (6.D5), reddish brown (9.D5) to violet brown (10.E6); with a velutinous surface, dry, densely covered with short and erect hairs brown to light-brown; regular margin exceeding lamellae; context thick, white. Lamellae crowded, free, membranous, white (1.A1) to cream (1.A2), changing to almost pink after dry (10.A4). Stipe 45–92 × 5–14 mm, central, with an abruptly bulbous base (12–27 mm), pink-brown, fibrillose surface, hollow, fibrous consistency; context pale-yellow; white rhizomorphs present at the base. Annulus

ascending, complex, halfway up stipe, pinkish with a dark serrulate margin at the top part, movable after drying. Odor pleasant. Spore print white (1.A1) to cream (1.A2).

Basidiospores [210,7,7], (5.5–)6–7(–9) × 4–5 µm, Q = 1.20–2.00, Q_{av} = 1.56, ellipsoid to oblong, hyaline, slightly thick-walled, without germ pore, dextrinoid, congophilous, metachromatic in Cresyl Blue. Basidia 18–22(–24) × 6–8 µm, clavate, hyaline, thin-walled, smooth, bearing four sterigmata 1.5–3 µm long. Pleurocystidia absent. Cheilocystidia (26–)30–60(–66) × (8–)10–16(–20) µm, with different forms (clavate, capitate, mucronate, lageniform), hyaline, thin-walled, smooth. Pileipellis a cutis with prostrate hyphae and erect terminal elements, 4–21 µm wide, with hyaline to grey or dark-grey intracellular pigment. Clamp-connections absent. Hymenophoral trama regular, with hyaline, thin-walled, smooth, cylindrical hyphae, 3–10 µm wide.

Habitat: growing solitary or in small groups on soil inside the forest.

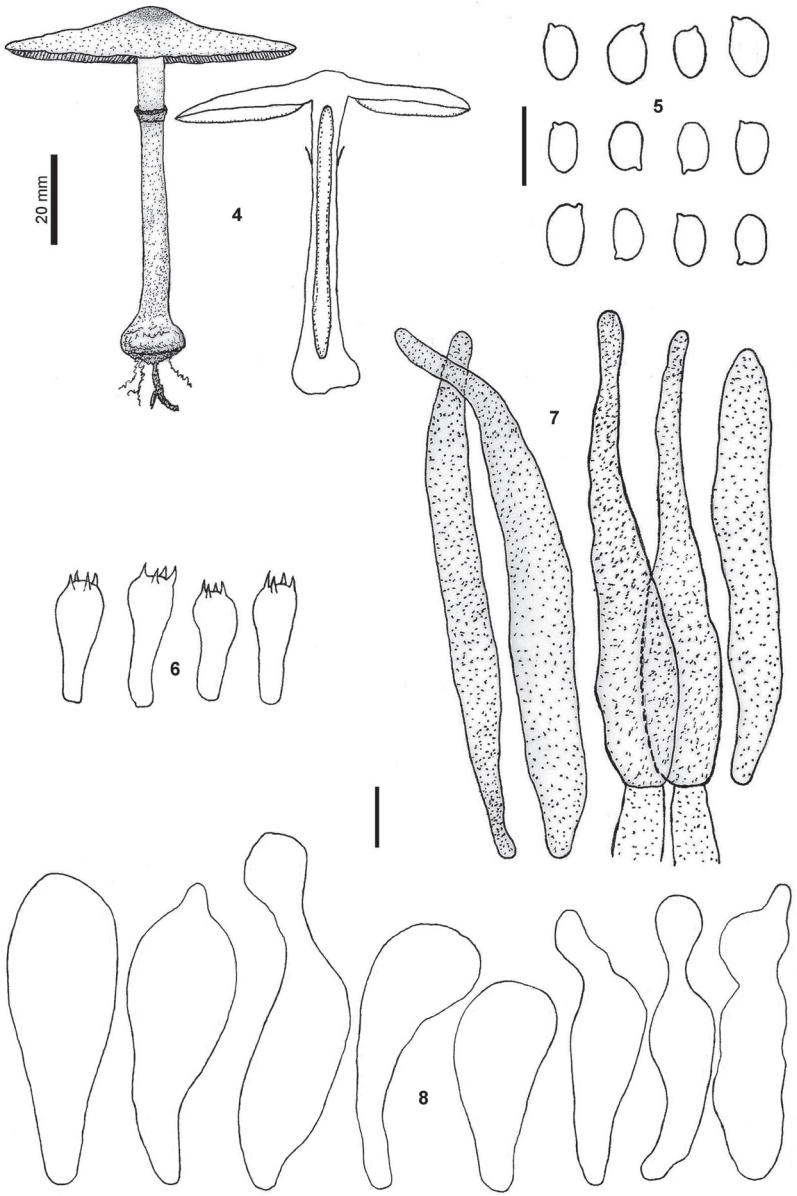
Recent specimens examined: BRAZIL. Rio Grande do Sul State. Viamão: Itapuã Park, Grota's Downhill, 16/IV/2005, M.S. Rother 041/05 (ICN 139314); Pedreira's Beach, 09/IV/2005, M.S. Rother 026/05 (ICN 139315); 06/X/2005, M.S. Rother 086/05 (ICN 139316); 22/X/2005, M.S. Rother 097/05 (ICN 139317); 27/I/2006, M.S. Rother 106/06 (ICN 139318). Porto Alegre: Farroupilha Park, 28/III/2007, M.S. Rother 138/07 (ICN 139319); M.S. Rother 139/07 (ICN 139320).

Additional specimens examined: ARGENTINA. Tucumán: Garden of the Institute Miguel Lillo, 09/IV/1949, leg. P. Antonuccio et Golbach, Singer T 396 (SYNTYPUS – LIL), Singer T 396 (BAFC 30539; 13/IV/1951, Singer T 1504 (SYNTYPUS – LIL); 28/XII/1951, Singer s/n (LIL); 16/II/1959, Singer (LIL); Avellaneda Park, 28/III/1951, Singer 1450 (LIL); Yerba Buena, 12/II/1955, Singer T 2164 (LIL).

Distribution: South America – northern Argentina (Tucumán): Singer & Digilio (1952) and southern Brazil (Paraná and Rio Grande do Sul): Meijer (2006); Sobestiansky (2005).

Remarks: This interesting species in *Leucoagaricus* Locq. ex Singer is placed in section *Piloselli* (Kühner) Singer based primarily on having lamellae that become pinkish with age (Singer 1986). It is a beautiful species, macroscopically characterized by the color of the basidiomata, the lamellae changing color with age, the abruptly bulbous stipe base with well developed rhizomorphs, and the annulus (movable after drying) with a serrulate margin.

Singer originally described *L. lilaceus* from Argentina (Singer & Digilio 1952). In his remarks, he did not mention key characters that would help diagnose it to species but merely noted that the species was extraordinarily beautiful and macroscopically easy to recognize. Singer also did not mention the presence of cheilocystidia (which we observed in both our own and Singer's collections). Through studying Singer's collections deposited in LIL and BAFC, we were able to confirm the identity of our collected specimens from southern Brazil.



Figures 4–8. *Leucoagaricus lilaceus*. (M.S. Rother 086/05).
4: Basidioma. 5: Basidiospores. 6: Basidia. 7: Pileipellis. 8: Cheilocystidia.
Scale bar = 10 µm (microscopic features).

Figure 9. Basidiomata of *Leucoagaricus lilaceus*. (Singer T 396).
Scale bar = 20 mm

The collection number cited by Singer & Digilio (1952) — T 306 09/IV/1949 — is incorrect; the labels on the type collections in LIL and BAFC read T 396. Singer & Digilio (1952) designated two collections as types (T 396 and T 1504); we prefer to treat those materials as syntypes because they were collected at different times.

Lepiota decorata Zeller, recently re-described from California (USA) and placed in *Leucoagaricus* sect. *Piloselli* based on morphology and molecular data (Vellinga 2007), is close to *Leucoagaricus lilaceus* in pileus color and microscopic characters but differs in the cylindrical stipe and the different annulus edge. This

Figure 10. Basidiomata of *Leucoagaricus lilaceus*. (M.S. Rother 097/05). Scale bar = 20 mm.

species occurs in the USA and France. *Leucoagaricus sublittoralis* (Kühner ex Hora) Singer, known from Europe, comes close in general aspect, but differs in the absence of staining reactions, a non-bulbous stipe base, and cheilocystidial shape (Bon 1981, Candusso & Lanzoni 1990, Vellinga 2001).

After more than a half century since its discovery, *Leucoagaricus lilaceus* has only recently been recorded from Brazil, from the states of Rio Grande do Sul (Sobestiansky 2005) and Paraná (Meijer 2006). Neither author provided descriptions or pictures of their collections, and their material is not available for revision or loan. If Sobestiansky's (2005) *Leucoagaricus* cf. *lilaceus* cannot be confirmed as *L. lilaceus*, then our specimens represent a first confirmed record of the species from Rio Grande do Sul.

We have repeatedly collected *Leucoagaricus lilaceus* in the urban area of Porto Alegre, capital of the state Rio Grande do Sul, which suggests that the species should be considered common in the Porto Alegre metropolitan region and possibly throughout the state of Rio Grande do Sul as well.

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